

Abstract

The experiment-based dynamic math teaching is an instruction model which enables students to acquire knowledge through personal operation and reflection with the aid of information technology. This study aims at investigating the effectiveness of the experiment-based dynamic teaching method on secondary students' math teaching. A quasi-experiment was conducted to compare the students' achievements and cognitive load (CL) between the traditional teaching and experiment-based dynamic teaching groups.

This study is conducted to investigate the following research questions:

1. Is the experiment-based dynamic teaching method more effective than the traditional teaching method for secondary students?
2. Do the students have lower cognitive load (CL) in the experiment-based dynamic math teaching than in the traditional teaching?

And this study reached following results:

1. On student's math learning achievements
 - Based on their original performance level, medium performance students in the experimental group got higher math scores than the control group, while high and low performance students got lower than the control group. And high performance students got greater decrease math scores.
 - There is no significant difference in math achievements between the experiment group and control group. The experimental group got higher increase in math achievements than the control group.

2. On student's self-reporting cognitive loads

- Both the experiment group and control group claimed an increased Cognitive Load in the second stage of the experiment-based teaching. At the first stage of teaching, the medium performance students got greatest difference in the average of CL; at the second stage of teaching, the low performance students got greatest difference in the average of CL.
- There is no significant difference on CL between the experiment and control groups. However, the experiment group claimed lower CL than the control group.

Combining the CL results with the students' achievements, it can be concluded that traditional teaching is more suitable for the high performance students, while the experiment-based dynamic math teaching is more suitable for the medium performance students in a short term view. It can also become suitable for the low performance students if they were familiar with the software tools.

Keywords: Dynamic Mathematic Geometric Software PG_Lab, Enquiry Learning, Math Performance, Cognitive Load